## Claims

[c1] 1. An integrated circuit for providing drive signals to a piezo element of a milli-actuator device in a mass data storage device, comprising:
a first circuit for receiving head position control signals and for providing a charging current to a sense capacitor in response thereto;
wherein said first circuit is powered by a voltage supply that is referenced to a substrate potential; and
a second circuit for mirroring a current in said first circuit at a predetermined mirror ratio to provide drive currents to said piezo element.

[c2] 2. The integrated circuit of claim 1 wherein said substrate potential is an analog ground potential.

[c3] 3. The integrated circuit of claim 1 wherein said voltage supply is a voltage supply other than a voltage supply for said piezo element.

[c4] 4. The integrated circuit of claim 1 wherein said predetermined mirror ratio is 10:1.

[c5] 5. The integrated circuit of claim 1 wherein said predetermined mirror ratio is 6.125:1.

[c6] 6. The integrated circuit of claim 1 further comprising:
a first switch connected to selectively disable said first circuit;
a second switch connected to selectively provide a feedback path from said second circuit to an input of said second circuit;
wherein when said first and second switches are selectively operated, said integrated circuit operates in a voltage mode.

[c7] 7. The integrated circuit of claim 1 further comprising servo circuitry integrated therewith.

[c8] 8. A milli-actuator driver for positioning a head of a hard disk drive, comprising:
first integrated circuit means for receiving head position control signals and for

providing a charging current to an external sense capacitor in response thereto;
wherein said first integrated circuit means is powered by a voltage supply that is referenced to a substrate potential; and
second integrated circuit means for mirroring a current in said first integrated circuit means at a predetermined mirror ratio to provide drive currents to a piezo element.

[c9] 9. The milli-actuator driver of claim 8 wherein said substrate potential is an analog ground potential.

[c10] 10. The milli-actuator driver of claim 8 wherein said voltage supply is a voltage supply other than a voltage supply for said piezo element.

[c11] 11. The milli-actuator driver of claim 8 wherein said predetermined mirror ratio is 10:1.

[c12] 12. The milli-actuator driver of claim 8 wherein said predetermined mirror ratio is 6.125:1.

[c13] 13. The milli-actuator driver of claim 8 further comprising:
a first switch connected to selectively disable said first integrated circuit; means
a second switch connected to selectively provide a feedback path from said second integrated circuit means to an input of said second integrated circuit; means
wherein when said first and second switches are selectively operated, said integrated circuit operate sin a voltage mode.

[c14] 14. The milli-actuator driver of claim 8 further comprising servo circuitry integrated therewith.

[c15] 15. An integrated circuit for providing drive signals to a piezo element of a milli-actuator device in a mass data storage device to position a data head thereof, comprising:
a current mirror;
said current mirror comprising:

a first current mirror portion;
said first current mirror portion being configured to receive head position control signals from a head position sensing circuit;
said first current mirror portion being configured to provide a first current in response to said head position control signals for connection to a capacitor;
said first mirror portion being powered by a voltage supply that is referenced to a substrate potential;
a second current mirror portion;
said second current mirror portion being configured to mirror said first current at a predetermined mirror ratio; and
said second current mirror being configured to provide drive currents for connection to said piezo element.

[c16] 16. The integrated circuit of claim 15 wherein said substrate potential is an analog ground potential.

[c17] 17. The integrated circuit of claim 15 wherein said voltage supply is a voltage supply other than a voltage supply for said piezo element.

[c18] 18. The integrated circuit of claim 15 wherein said predetermined mirror ratio is 10:1.

[c19] 19. The integrated circuit of claim 15 wherein said predetermined mirror ratio is 6.125:1.

[c20] 20. The integrated circuit of claim 15 further comprising:
a first switch connected to selectively disable said first current mirror portion
a second switch connected to selectively provide a feedback path from said second current mirror portion o an input of said second current mirror portion
wherein when said first and second switches are selectively operated, said integrated circuit operate sin a voltage mode.

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[c21] 21. The integrated circuit of claim 15 further comprising servo circuitry integrated therewith.

[c22] 22. A method for operating a milli-actuator driver for a mass data storage device, comprising:
providing a current mirror having first and second current outputs,
wherein said first and second current outputs have a ratio of 1X:nX;
wherein said first current output is adapted to be connected to a capacitor;
wherein said second current output is adapted to be connected to a piezo element of milli-actuator; of said mass data storage device
providing a supply voltage to at least a first portion of said current mirror that is referenced to a ground voltage.

[c23] 23. The method of claim 22 wherein said ground voltage is a substrate potential.

[c24] 24. The method of claim 22 further comprising configuring said current mirror to have a 1X:nX ratio of 1:10.

[c25] 25. The method of claim 22 further comprising configuring said current mirror to have a 1X:nX ratio of 1:6.125.

[c26] 26. The method of claim 22 further comprising:
providing a first switch connected to selectively disable said first current output of said current mirror.
providing a second switch connected to selectively provide a feedback path for said second current output of said current mirror.
wherein when said first and second switches are selectively operated, said milli-actuator driver operates in a voltage mode.